CLAIMS

1. A sensor assembly for sensing angular position of one object relative to another object, said sensor assembly comprising:

a transmitter capacitor plate defining a transmitter surface area, said transmitter surface area comprising at least one transmitter electrode;

a receiver capacitor plate disposed in stationary, juxtaposed relation to said transmitter capacitor plate, said receiver capacitor plate defining a receiver surface area facing said transmitter surface area, said receiver surface area generally corresponding in size to said transmitter surface area, said receiver surface area comprising at least two receiver electrodes forming at least one receiver electrode pair;

a rotor composed of a dielectric material disposed within an air gap between the transmitter and receiver surface areas, said rotor comprising three wedge shaped segments having a common rotor center, wherein a first segment subtends substantially 67.5 degrees about said rotor center, a second segment subtends substantially 67.5 degrees about said rotor center and a third segment subtends substantially 45 degrees about said rotor center, and wherein the first segment is separated from the second segment by a vacancy subtending substantially 45 degrees about said rotor center and wherein the third segment is disposed, relative to said rotor center, diametrically opposite said vacancy in substantially equidistant disposition between to said first and second segments, wherein rotation of said rotor relative to said transmitter and receiver capacitor plates varies capacitance between said at least one transmitter electrode and said at least two receiver electrodes; and

means for measuring net charge induced on said at least one receiver electrode pair, wherein the charges indicate the angular position of said rotor relative to said transmitter and receiver capacitor plates.

2. The sensor assembly of Claim 1, wherein:

said transmitter capacitor plate has a transmitter plate center axially aligned with said rotor center, said at least one transmitter electrode comprising a semi-circularly shaped first transmitter electrode and a semi-circularly shaped second transmitter electrode disposed diametrically opposite, with respect to said transmitter plate center, said first transmitter electrode; and

said receiver capacitor plate has a receiver plate center axially aligned with said rotor center, said at least two receiver electrodes comprising at least four wedge-shaped receiver electrodes, each receiver electrode being connected to a respectively counterpart receiver electrode disposed diametrically opposite thereto with respect to said receiver plate center so as to respectively provide a said receiver electrode pair.

3. The sensor assembly of Claim 2, wherein said segments define a first circular periphery concentric with respect to said rotor center, said first and second transmitter electrodes define a second periphery adjacent a transmitter plate outside edge, and said at least four receiver electrodes define a third periphery adjacent a receiver plate outside edge; wherein said second and third peripheries are substantially equivalent and wherein said first periphery is larger than said second and third peripheries.

4. The sensor assembly of Claim 2, wherein said means for measuring comprises:

an excitation signal source supplying excitation signals to said first and second transmitter electrodes; and

charge to voltage measuring means for providing a voltage responsive to the net charge respectively induced on each said receiver electrode pair, wherein the voltages are indicative of the angular position of said rotor relative to said transmitter and receiver capacitor plates.

5. The sensor assembly of Claim 4, wherein said plurality of receiver electrodes comprises eight receiver electrodes.

6. The sensor assembly of Claim 5, wherein said segments define a first circular periphery concentric with respect to said rotor center, said first and second transmitter electrodes define a second periphery adjacent a transmitter plate outside edge, and said at least four receiver electrodes define a third periphery adjacent a receiver plate outside edge; wherein said second and third peripheries are substantially equivalent and wherein said first periphery is larger than said second and third peripheries.

7. The sensor assembly of Claim 4, wherein said means for measuring comprises:

a source of alternating current providing a first alternating current signal to said first transmitter electrode;

an analog inverter providing, in combination with said source of alternating current, a second alternating current signal to said second transmitter electrode;

a current to voltage converter providing a voltage responsive to the net charge respectively induced on each said receiver electrode pair; and

a receiver pair select switch which selects connection of each said receiver electrode pair individually to said current to voltage measuring means;

wherein the voltages are indicative of angular position of said rotor relative to said receiver and transmitter capacitor plates.

8. The sensor assembly of Claim 7, wherein said plurality of receiver electrodes comprises eight receiver electrodes.

9. The sensor assembly of Claim 8, wherein said segments define a first circular periphery concentric with respect to said rotor center, said first and second transmitter electrodes define a second periphery adjacent a transmitter plate outside edge, and said at least four receiver electrodes define a third periphery adjacent a receiver plate outside edge; wherein said second and third peripheries are substantially equivalent and wherein said first periphery is larger than said second and third peripheries.

10. A sensor assembly for sensing angular position of one object relative to another object, said sensor assembly comprising:

a transmitter capacitor plate defining a transmitter surface area, said transmitter surface area comprising a semi-circularly shaped first transmitter electrode and a semi-circularly shaped second transmitter electrode disposed diametrically opposite, with respect to said transmitter plate center, said first transmitter electrode;

a receiver capacitor plate disposed in stationary, juxtaposed relation to said transmitter capacitor plate, said receiver capacitor plate defining a receiver surface area facing said transmitter surface area, said receiver surface area generally corresponding in size to said transmitter surface area, said receiver surface area comprising eight wedge-shaped receiver electrodes, each receiver electrode being connected to a respectively counterpart receiver electrode disposed diametrically opposite thereto with respect to said receiver plate center so as to respectively provide a receiver electrode pairs, whereby said receiver electrodes provide four receiver electrode pairs;

a rotor composed of a dielectric material disposed within an air gap between the transmitter and receiver surface areas, said rotor comprising three wedge shaped segments having a common rotor center, wherein a first segment subtends substantially 67.5 degrees about said rotor center, a second segment subtends substantially 67.5 degrees about said rotor center and a third segment subtends substantially 45 degrees about said rotor center, and wherein

the first segment is separated from the second segment by a vacancy subtending substantially 45 degrees about said rotor center and wherein the third segment is disposed, relative to said rotor center, diametrically opposite said vacancy in substantially equidistant disposition between to said first and second segments, wherein rotation of said rotor relative to said transmitter and receiver capacitor plates varies capacitance between said first and second transmitter electrodes and said receiver electrodes; and

means for measuring net charge induced on each said receiver electrode pair, wherein the charges indicate the angular position of said rotor relative to said transmitter and receiver capacitor plates.

11. The sensor assembly of Claim 10, wherein said transmitter capacitor plate has a transmitter plate center axially aligned with said rotor center and a transmitter plate outside edge concentrically disposed with respect to said transmitter plate center; and wherein said receiver capacitor plate has a receiver plate center axially aligned with said rotor center and a receiver plate outside edge concentrically disposed with respect to said receiver plate center.

12. The sensor assembly of Claim 11, wherein said segments define a first circular periphery concentric with respect to said rotor center, said first and second transmitter electrodes define a second periphery adjacent said transmitter plate outside edge, and said receiver electrodes define a third periphery adjacent said receiver plate outside edge; wherein said second and third peripheries are substantially equivalent and wherein said first periphery is larger than said second and third peripheries.

13. The sensor assembly of Claim 12, wherein said means for measuring comprises:

an excitation signal source supplying excitation signals to said first and second transmitter electrodes; and

a current to voltage converter providing a voltage responsive to the net charge respectively induced on each said receiver electrode pair, wherein the voltages are indicative of the angular position of said rotor relative to said transmitter and receiver capacitor plates.

14. The sensor assembly of Claim 12, wherein said means for measuring comprises:

a square wave generator generating a first alternating current signal to said first transmitter electrode;

an analog inverter generating, in combination with said square wave generator, a second alternating current signal to said second transmitter electrode;

a current to voltage converter providing a voltage responsive to the net charge respectively induced on each said receiver electrode pair; and

a receiver pair select switch which selects connection of each said receiver electrode pair individually to said current to voltage measuring means;

wherein the voltages are indicative of angular position of said rotor relative to said receiver and transmitter capacitor plates.